Which aspects of NIF implosions could be impacted by kinetic physics?

Kinetic Physics Workshop, Apr. 7, 2016

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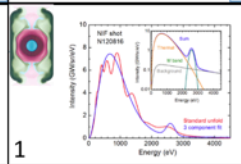
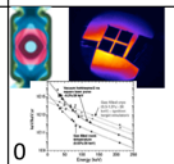
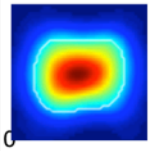
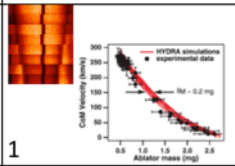
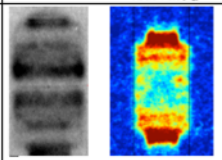
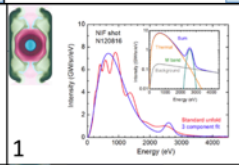
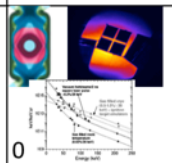
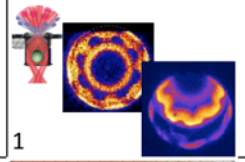
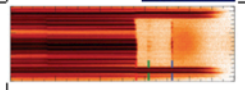
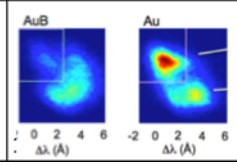
Summarized as each new platform deployed: Could KE affect NIF ID results and other findings, does result matter and if yes, strategy to resolve

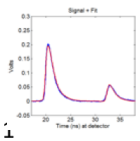
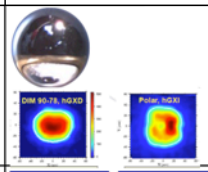
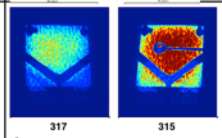
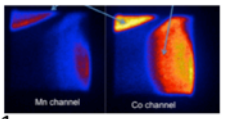
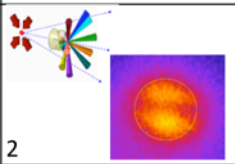
Example sorted chronologically

Physics Issue	New Technique on NIF	New Platforms on NIF	End Results	Other Findings	Data examples	Could Kinetic Effects affect End Results or Other Findings?	Does this matter for ignition or how could we avoid/resolve?
X-ray Drive	192 Beam Hohlraum	Vacuum Hohlraum	Drive higher than expected in vacuum NIF hohlraums, led to HF model	M-band fraction bit more than modelled initially	 1	Yes, high Flux model decreased flux limiter; Hard x-rays are NLTE driven	Change wall material and/or capsule dopant level
Laser Coupling	Backscatter and near backscatter calorimetry, imaging and spectroscopy	Gas-filed Hohlraum	15% BS for gas-filled hohlraums, dominated by inner SRS with associated hot electrons	Super hot electrons as lengthen pulse; DRDs can be used to extract SBS variability	 0	Yes, LPI saturation and growth depend on kinetic effects	Go to lower gas-fill
Symmetry control	Warm Symcap	Symcap	Better symmetry with CH hohlraum gas-fill, why?	Tent feature disappeared (sign of lower contact angle?)	 0	Maybe, if due to Z/A dependence on LPI	Reduce gas-fill; foams
Capsule Rocket efficiency	Gated backlit radiography of peak velocity	ConA	Rocket model (Vimp vs MR) for CH as expected within error bars	Peak velocity less than expected especially for CH(Ge), consistent with late bangtime; switch to CH(Si)	 1	Not likely, Ge L-shell EOS or opacity uncertainties	Reduce dopant levels by reducing preheat with pure U hohlraums or foam lined
Spot Imaging	Hard x-ray wall imaging		Inner spots weak	LEH ring emission brighter than expected; Occasional top-bottom asymmetry?		Bright ring at LEH may be due to B fields	No obvious effect; weaker if open up LEH, shorter pulse

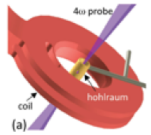
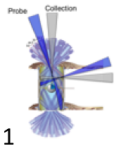
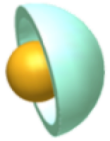
Sorted for results probably affected by KE (1)

Physics Issue	New Technique on NIF	New Platforms on NIF	End Results	Other Findings	Data examples	Could Kinetic Effects affect End Results or Other Findings?	Does this matter for ignition or how could we avoid/resolve?
X-ray Drive	192 Beam Hohlraum	Vacuum Hohlraum	Drive higher than expected in vacuum NIF hohlraums, led to HF model	M-band fraction bit more than modelled initially	 1	Yes, high Flux model decreased flux limiter; Hard x-rays are NLTE driven	Change wall material and/or capsule dopant level
Laser Coupling	Backscatter and near backscatter calorimetry, imaging and spectroscopy	Gas-filed Hohlraum	15% BS for gas-filled hohlraums, dominated by inner SRS with associated hot electrons	Super hot electrons as lengthen pulse; DRDs can be used to extract SBS variability	 0	Yes, LPI saturation and growth depend on kinetic effects	Go to lower gas-fill
Drive deficit or reduced rocket efficiency?	Dante view through 100% LEH at one end	Viewfactor hohlraum	Drive deficit wrt high-flux model is main issue in gas-filled hohlraum	Au bubble larger than expected, delta 50° - 44.5° scales with pulse length, reduced wth quad splitting	 1	Possible, kinetic effects (ion-acoustic turbulence) as laser power increases on final rise	Use lower gas-fill where less deficit, quad splitting
DD vs DT surrogacy for shock timing	Solid DT shock timing	Solid DT keyhole	Expected offsets between DD and DT shock speeds, so timing should be good	Hot electron preheat observable from shock acceleration in rarefied DT	 1	Probably involved in hot electron creation and transport (B fields)?	Reduce hots by low gas-fill
Outer beam SBS		B-doped Au liner	Ambiguous; reduces late-time Au SBS, but sometimes enhances early SBS?			Kinetic effects could explain unexpected results?	Important to sort out for low fill hohlraums for laser safety

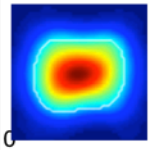
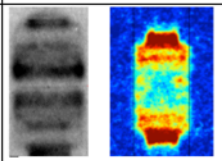
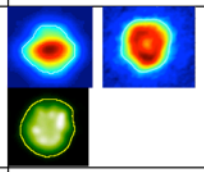
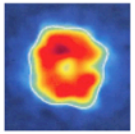
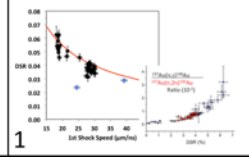
Sorted for results probably affected by KE (2)

Physics Issue	New Technique on NIF	New Platforms on NIF	End Results	Other Findings	Data examples	Could Kinetic Effects affect End Results or Other Findings?	Does this matter for ignition or how could we avoid/resolve?
Shock flash timing	Shock flash timing for symcaps	Low LPI NV Hohlraums	For NV HDC, shock flash-BT interval time close to expected		 1	Kinetic effects could affect shock bangtime; pToF suggest OK, but check 4 shock and n+1 shock cases	May not matter to compression phase
Alternate Ablator		Be(Cu)	HF Be coast implosion performs similar to CH(Si), suggesting hohlraum symmetry main issue	More BS (from more Be filling)?		Interpenetration, blow-off could have kinetic component at low fill	Add bit of gas to get out of kinetic regime
CBET and backscatter correlations	Inner beam glint detection and backscatter polarimetry		CBET and backscatter varies with polarization	Evidence of amplified glint	 1	CBET saturation a kinetic effect, currently a fitting variable	Reduce gas-fill so don't need CBET
Capsule/ Hohlraum blow-off inter-penetration	Dual tracer x-ray imaging	Dot tracer on hohlraum wall	Seems to fit 2D modelling at 0.6 mg/cc fill		 1	Need to go to lower fill for kinetic effects to matter	Keep bit of gas to stay out of kinetic regime, or use foam-liners to tamp wall
B fields in hohlraum limiting conduction	Proton radiography	15 MeV Proton source			 2	Besides hohlraum B fields, could we have B fields in capsule at stagnation limiting thermal conduction?	Measure B isolated from E

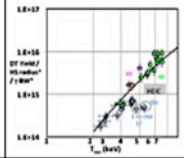
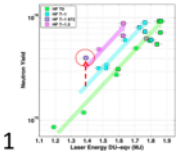
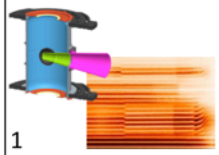
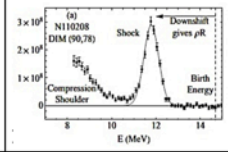
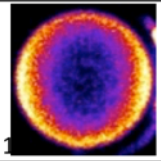
Sorted for results probably affected by KE (3)

Physics Issue	New Technique on NIF	New Platforms on NIF	End Results	Other Findings	Data examples	Could Kinetic Effects affect End Results or Other Findings?	Does this matter for ignition or how could we avoid/resolve?
Reduced conduction losses, hotter fill	External B field	*Pulsed Coil*			 1	Kinetic effects are used for control here	B fields could reduce conduction, better for stagnated capsule margin
Hohlraum corona conditions	UV Thomson scattering				 1	Heat transport from non-Maxwellian tails?	TS could evaluate kinetic effects (heat transport) from non-Maxwellian features?
Hot electrons at capsule during final rise	Mo K-alpha fluorescence	Buried Mo symcap			 1	Beaming of hot electrons from shared plasma wave?	Go to low gas-fill

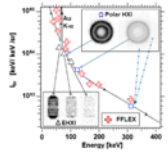
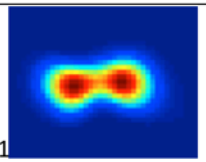
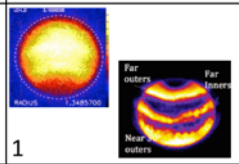
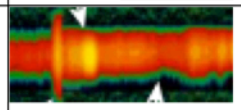
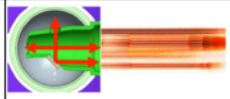
Sorted for result that might be affected by KE (4)

Physics Issue	New Technique on NIF	New Platforms on NIF	End Results	Other Findings	Data examples	Could Kinetic Effects affect End Results or Other Findings?	Does this matter for ignition or how could we avoid/resolve?
Symmetry control	Warm Symcap	Symcap	Better symmetry with CH hohlraum gas-fill, why?	Tent feature disappeared (sign of lower contact angle?)	 0	Maybe, if due to Z/A dependence on LPI	Reduce gas-fill; foams
Spot Imaging	Hard x-ray wall imaging		Inner spots weak	LEH ring emission brighter than expected; Occasional top-bottom asymmetry?		Bright ring at LEH may be due to B fields	No obvious effect; weaker if open up LEH, shorter pulse
Symmetry control	Cryo Symcap	Symcap	CBET required to tune P2 symmetry in > 0.6 mg/cc gas-filled hohlraums	Late BT; Evidence of hot spot "chunk" mix with DD fill; Tent scar growth changed sign of P4 (-ve to +ve), reduced P2		Amendt Au/gas interface temperature inversion?	Go to lower gas-fill and avoid CBET
THD and DT Core shape	THD and DT Layered implosion	High yield core	Reasonable correlation in shape wth symcap	Evidence of burn quench near filltube location (jet)?	 2	Anomalous diffusion seeded by fill-tube perturbation?	Reduce fill tube growth with Be capsule or overcoat?
Fuel rhor	Downscattered Ratio		Maximum DSR higher with lower adiabat (weaker first shock) as expected	DSR lower than expected (truncated burn?) and only depends on shock timing when low coast	 1	Anomalous ablator/fuel mix?	Need to test if HDC and Be ablators can go to high ρr (dsr)

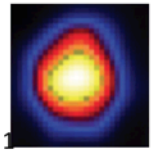
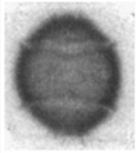
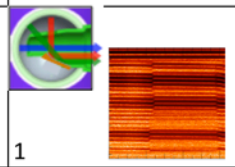
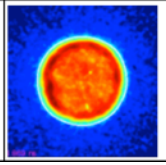
Sorted for result that might be affected by KE (5)

Physics Issue	New Technique on NIF	New Platforms on NIF	End Results	Other Findings	Data examples	Could Kinetic Effects affect End Results or Other Findings?	Does this matter for ignition or how could we avoid/resolve?
DD and DT Tion	DT implosion		Yield correlates with Tion^4 as expected when no mix	DT and DT-DD Tion larger than expected (truncated burn?)		Perhaps if D vs T separation or Knudsen effect if local sharp gradients (Kagan)	Need core Te(t) for more information
DT Yield	Total Yield by neutron spectrometers	DT implosion	NIC yield variability due to mix/large hydrogrowth; HF and AS yields clamped at 1e16 for all capsule thicknesses	Inferred stagnation pressure and hot spot rhor less than expected (truncated burn due to tent aneurisms?)	 1	Knudsen not likely at high density; D vs T separation?	Need to resolve; test alternate to tent
Equatorial Shock timing	Re-entrant keyhole	Keyhole	Timed first 2 shocks improves dsr when low coast	Uncovered ice on LEH window Final shock slower than expected	 1	LPI on final rise?	Go to lower gas-fill where final shock velocity closer to expected
Shock flash rhor	Shock flash rhor for symcaps	D-3He symcap fills	Pole shock flash ρr close to expected	Pole to equator ρr variation sometimes larger than expected, but gone for NV		Maybe, but no ρr or timing discrepancy when measured	
Picket P2 and m4 symmetry	Reemission Sphere	Bi sphere	Tuned picket P2 and m4 symmetry	More Picket CBET than expected	 1	Could be kinetic effect though picket CBET not dependent on kinetic saturation parameter	Use low gas-fill with $\Delta\lambda = 0$, so little CBET in picket

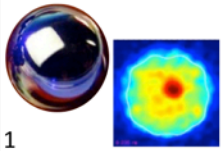
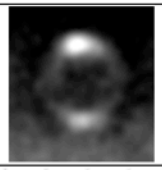
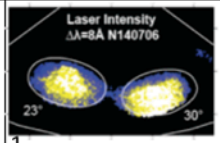
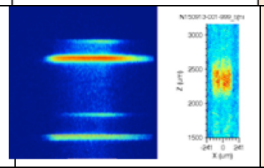
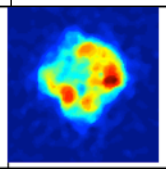
Sorted for result that might be affected by KE (6)

Physics Issue	New Technique on NIF	New Platforms on NIF	End Results	Other Findings	Data examples	Could Kinetic Effects affect End Results or Other Findings?	Does this matter for ignition or how could we avoid/resolve?
Total hot electrons at capsule	Hard X-ray Capsule Imaging		Hot electron preheat (if during peak power) within tolerable level for NIC design (< 5% adiabat increase)	HF preheat 10x greater, attributed to higher gas-fill, more foot power		B field might collimate hot electrons for other designs not checked by hard x-ray imaging	Use low gas-fills where superhots 100-1000x less
Hot spot core size and shape	Unscattered Neutron Imaging	Higher Yield DT	Follows x-ray core shape and size	Toroidal limb brightened shapes for many campaigns suggesting P2 swing, even without CBET	 1	Not CBET specific	Eliminate P2 swing by careful tuning, more radiography near BT
LEH closure	LEH x-ray imaging		Less LEH closure than HYDRA calculations, so overestimating Tr	Evidence of Au/gas RT growth at azimuthal modes 24-28	 1	Could be mix per Amendt, changing heat conduction	Not likely as high azimuthal modes, smoothed out
Hot-spot mix	Core dopant spectrosopy	CH(Ge, Cu)	Mix due to ablation front seeded growth; Evidence for CH(Ge)/ inner CH Mix	Impurity continuum emission can be used to extract hot spot mix	 1	Could be anomalous diffusion as current models do not predict atomic mix	Go to low Ablation Front growth factor (Be or Be overcoat, adiabat-shaped pulse)
P2 Shock symmetry	Re-entrant dual axis keyhole	Keyhole + mirror	Symmetrized shock P2		 1	Possibly, if NLTE emission issue	Retune by 2nd shock cone fraction

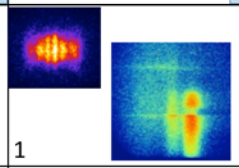
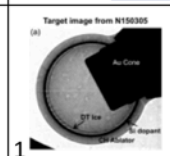
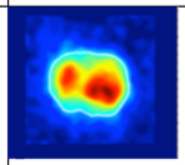
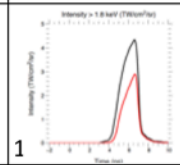
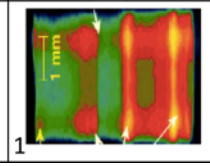
Sorted for result that might be affected by KE (7)

Physics Issue	New Technique on NIF	New Platforms on NIF	End Results	Other Findings	Data examples	Could Kinetic Effects affect End Results or Other Findings?	Does this matter for ignition or how could we avoid/resolve?
Fuel size and shape	DS Neutron Imaging	Layered DT	Fuel mass compactness less than expected (mixed further out with ablator?)			Ablator-fuel diffusion reducing final fuel rhor and dsr?	Test limits of convergence in other ablators (HDC, Be)
In-flight capsule polar symmetry	Backlit 2D capsule imaging	2DConA	NIC hohlraum was too short (P_4 asymmetry biased by tent)	Tent leads to > than expected instability growth		Only if non-local heat conduction alters RT growth/stabliization of seeded tent perturbation	Use tent alternate; Longer hohlraum or P4 shim on capsule
P4 Shock symmetry	Re-entrant tri axis keyhole	Keyhole + dual mirror	Symmetrized shock P4 with longer hohlraum			Relative propagation and CBET of inners and outers	Retune with different length hohlraum or P4 shim on capsule
Improved symmetry control		Rugby hohlraum	Symmetry with little reliance on CBET	LEH plasma forced repointing; Reduced e- preheat (less filling or split beams)?		Possible anomalous LEH plasma expansion?	Retest on latest low gas-fill designs if cylinders have issues
1D implosion performance		Low CR exploding pusher implosion	1D performance at CR = 5	Spitzer conductivity explains hot spot profile		Low CR implosion says not, but need tests at even higher Te	Could affect ignition margin

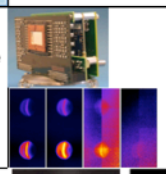
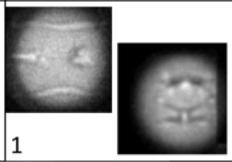
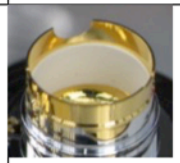
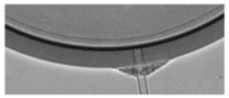
Sorted for result that might be affected by KE (8)

Physics Issue	New Technique on NIF	New Platforms on NIF	End Results	Other Findings	Data examples	Could Kinetic Effects affect End Results or Other Findings?	Does this matter for ignition or how could we avoid/resolve?
Alternate Ablator		HDC	Similar performance to CH; evidence of more filltube and AF growth seeded mix	HDC could retain μstructure on release into DT even above 7 Mbar (OMEGA); explain low dsr?	 1	Latent heat time-dependent effects? Orth spallation effect?	Could set lower 1st shock P and hence adiabat limit for HDC; Higher picket AS CH may be OK
Hot electron production and transport during window burnthrough	50 keV x-ray imaging of high Z ball		Picket hot electrons mitigated by longer toe, lower picket power	Beaming of hot electrons possible, attributed to collective outer cone SRS	 1	B field could still play a role?	Stay below beaming threshold; check for beaming on final rise (Dewald)
Picket CBET more than expected based on reemit data	X-ray imaging of transmitted beam	Quartraum	Confirms greater than expected CBET during picket	Variability in Outer beams post CBET	 1	Filamentation issues?	Avoid foot CBET by zeroing wavelength differential
Gas-filled hohlraum energy balance	Tracer x-ray spectroscopy for Te	Dot tracer on capsule	Peak Te 0.5 keV hotter than standard model in gas-filled hohlraum, and cools more slowly	Dot motion is less than expected (hydrocoupling?)		Kinetic effects will matter more as density drops	Add bit of gas to get out of kinetic regime
Divot growth		Capsule wth divot	See Ge emission at divot with current broadband imaging	Also see feature ascribed to filltube		Anomalous diffusion possible?	Be-coated HDC or CH? Check for HDC and Be microstructure growth

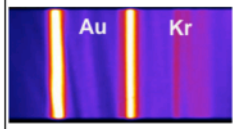
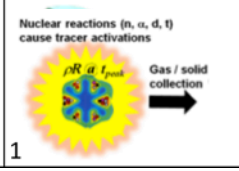
Sorted for result that might be affected by KE (9)

Physics Issue	New Technique on NIF	New Platforms on NIF	End Results	Other Findings	Data examples	Could Kinetic Effects affect End Results or Other Findings?	Does this matter for ignition or how could we avoid/resolve?
Peak velocity growth	Self backlit capsule by shock flash	Ar and Cu doped symcap	AF Growth to peak velocity close to predicted (but saturated)	Growth at pole is 2x less than equator (due to M-band VF?); Have measure of ablator ρr from Cu spectra	 1	Related to outer beam NLTE M-band strength?	Measure M-band at capsule (Dewald) if concerned
Interface growth	Backlit DT layered capsule on keyhole	Layered HGR	Growth due to feed-out, feed-in close to predicted at mode 60		 1	Anomalous diffusion exacerbating high mode mix?	Need to measure higher mode interface growth (target-mounted slit)
3D structure and flows in hot spot	Ultrafast gated imaging		Evidence of finer scale flows			Turbulence vs viscosity issues (kinetic related)?	Need better data: Penumbral few μm imaging onto SLOS 10 ps detector
X-ray preheat control		Pure U hohlraum	X-ray preheat fraction drop as expected; greater than expected velocity increase; HDC IFAR greater	Stagnation feature for Au but not for U	 1	Is difference in stagnation due to Z/A differences (seems unlikely)?	U hohlraum is favored
Au corona hohlraum energy balance	Au L-shell x-ray spectroscopy for Au Te	LEH cut-out for Au bubble view	Au LEH lip emission appears hotter than bubble		 1	Sign of B field or other mechanism limiting thermal conduction at LEH lip?	Does not seem to stop symmery tuning

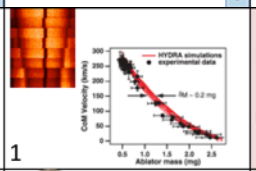
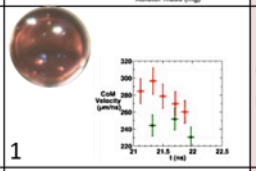
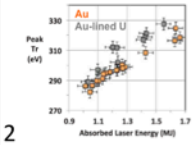
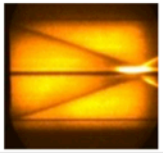
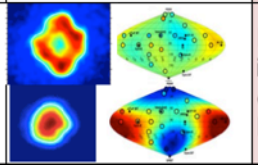
Sorted for result that might be affected by KE (10)

Physics Issue	New Technique on NIF	New Platforms on NIF	End Results	Other Findings	Data examples	Could Kinetic Effects affect End Results or Other Findings?	Does this matter for ignition or how could we avoid/resolve?
LEH closure rate and delivered CF vs t	Gated LEH x-ray imaging		See time-dependent LEH closure close to expected, and expanding Au bubble	See ≈ mode 64 structure at beam locations for moderate gas-fill		Kinetic effects explaining mid-mode structure? Need more data when seeded	Mid-modes do not matter to symmetry, but is it sign of energy sink?
High adiabat path to 1D		Thin DT layer in subscale HDC	P2(t) as calculated, low BS, ready for DT shot		 2	Awaiting clean DT shot	
Filltube growth	Backlit radiography of filltubes	Cantilevered filltubes	Bubble vs spike at filltube; cantilevered filltube shadowing effects close to expected	Other growth features (shadowing effects perhaps upon UV curing)?	 1	No, unless anomalous diffusion	O barrier for CH
Preheat and wall blow-off control		Mid-Z foam lined hohlraum (ZnO)	3x X-ray preheat fraction drop	Only 15% drop in thermal x-rays		NLTE physics, and future results on SBS mitigation in Mid Z/Low Z foam may be dependent on kinetic effects	More data on more relevant lower density foams
Hot spot formation	Wetted Foam implosion	Wetted foam HDC capsule			 1	By their absence; goes to more hydrodynamic shock flash conditions	Tests performance vs hot spot convergence ratio

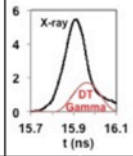
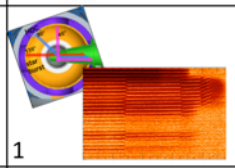
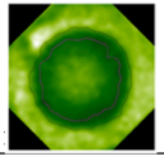
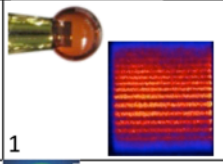
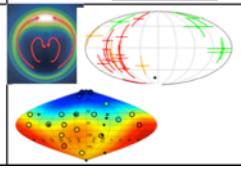
Sorted for result that might be affected by KE (11)

Physics Issue	New Technique on NIF	New Platforms on NIF	End Results	Other Findings	Data examples	Could Kinetic Effects affect End Results or Other Findings?	Does this matter for ignition or how could we avoid/resolve?
Hotspot n_e and $T_e(t)$ check	Dopant spectroscopy	Doped symcap	Must be gated to see 3-1 He-like vs Li-like ratio		 1	Thermalization time in tail of distribution where kinetic and non-local effects matter more; thermo-diffusion?	Check Te by continuum slope w/o dopants
Hot spot Mix	Reaction Br(d,2n)Kr	*Br-doped capsule*			 1	Check of ablator mix in hotspot, could be sensitive to chunk vs atomic mix	Avoid hot spot cooling by mid Z materials

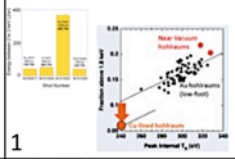
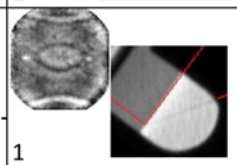
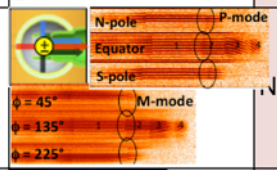
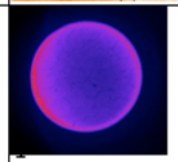
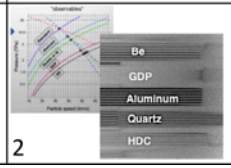
Sorted for result not likely affected by KE (12)

Physics Issue	New Technique on NIF	New Platforms on NIF	End Results	Other Findings	Data examples	Could Kinetic Effects affect End Results or Other Findings?	Does this matter for ignition or how could we avoid/resolve?
Capsule Rocket efficiency	Gated backlit radiography of peak velocity	ConA	Rocket model (Vimp vs MR) for CH as expected within error bars	Peak velocity less than expected especially for CH(Ge), consistent with late bangtime; switch to CH(Si)	 1	Not likely, Ge L-shell EOS or opacity uncertainties	Reduce dopant levels by reducing preheat with pure U hohlraums or foam lined
Capsule Dopant		Polymer capsule implosions	CH(Ge) slower than CH(Si); mix can be mitigated with high picket to reduce RM node	O uptake sensitivity for GDP exposed to light	 1	Ge L shell opacity issue uncertainty?	Lower dopant levels and use pure U hohlraum; Coat CH capsules with few nm barrier
Drive and preheat optimization		Au-lined DU hohlraum	Increased peak drive by ≈10% as expected		 2	No, Marshak wave effect	Useful; Pure U even better C.E.
Capsule Rocket efficiency	Streaked backlit radiography of peak velocity	ConA	Confirmed gated data velocity	More shell decompression than expected when coasting	 1	Not likely; EOS or 3D issue?	Push longer
Residual KE, symmetry swings, fuel uniformity			Correlation between core polar images and FNADs on evidence of polar icecaps and jets	Observe semi-random phase for mode 1 fuel ρr asymmetry		No, mode 1 is an imbalance, unless some chaotic behavior driven by kinetic effect?	If mode 1 layer-specific, will it still show up in lower convergence layered implosions?

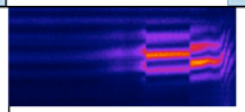
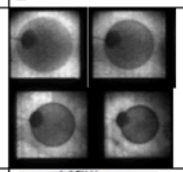
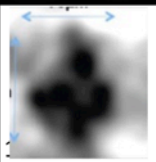
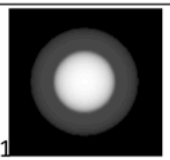
Sorted for result not likely affected by KE (13)

Physics Issue	New Technique on NIF	New Platforms on NIF	End Results	Other Findings	Data examples	Could Kinetic Effects affect End Results or Other Findings?	Does this matter for ignition or how could we avoid/resolve?
X-ray vs gamma burnwdths	Streaked core emission		Gamma burnwidths greater than expected	X-ray shorter than gamma burnwidths for higher yields		Not likely, either GRH overestimate or non-synchronous stagnation	Check for opacity issues with higher energy x-ray channels
m2, m4 Shock symmetry	Re-entrant tri axis keyhole	Keyhole + dual rotated mirror	See little m2 and m4 shock asymmetry		 1	Relative CBET, 23° vs 30°, in foot	Rebalance 23° vs 30° power if necessary
In-flight capsule azimuthal symmetry	Backlit 2D capsule imaging	2DConA Pole	M-mode in-flight asymmetries are small as expected			No, lowest intrinsic azimuthal mode is strongly smoothed out	Tweak 23 vs 30° cone fraction if needed
2D Ablation front growth	Backlit radiography of rippled capsules in keyhole geometry	HGR	Ablation front growth rates and dispersion close to expected, CH and HDC, LF, HF, AS	AF dispersion curve dictated by ablative stabilization during 1st shock transit, favoring Be most, HDC least	 1	No anomalies so far	Be-coated HDC or CH? Check for Be microstructure
Residual bulk flows in hot spot	Doppler shift analysis of nToF, x-ray core image P1 motion analysis	P1 driven symcap and DT	Expected correlation between P_1 ρr, directed velocity and P_2 Tion	Observe preferential direction for mode 1 bulk flows, but could be partly instrumental		Intentional P1 acted as expected; but random P1 still a mystery?	Check if mode 1s persist for lower convergence DT layer or wetted foam P1

Sorted for result not likely affected by KE (14)

Physics Issue	New Technique on NIF	New Platforms on NIF	End Results	Other Findings	Data examples	Could Kinetic Effects affect End Results or Other Findings?	Does this matter for ignition or how could we avoid/resolve?
X-ray preheat control		Mid-Z lined hohlraums (Cu)	2x X-ray preheat fraction drop as expected	Only 15% drop in thermal x-rays; increase in SBS	 1	NLTE x-ray emission physics	Check again with more relevant low density foam liner designs
3D Ablation front growth of native roughness	Backlit radiography of native roughness including tent	Ultimate HGR	Growth of tent 3x higher than initially predict; some variability (lift-off angle dependent)	Lift-off angle 2x more; Unexpected capsule build features (light and UV cure activating O non-uniform uptake)?	 1	Difficult to model hydrodynamics	Use tent alternate; test for seed mitigation with O barrier on CH
Shock P_1/m_1 symmetry	5-axis keyhole	4 mirror keyhole	Correlation between laser and shock P_1; shock m_1 small as expected	VISAR reflection off LEH window provides prepulse detection		Not likely	Laser prepulse monitored more closely
Early time glint on capsule in NV hohlraum	Early-time pole reemit		Not specular, not a midmode threat			No issue so far	Check for new designs (function of gas-fill)
Relative Ablator EOS	Four sample ID impedance match planar package		Steady shock to 2%;	Sensitive to Al EOS standard	 2	Not likely	May change margins a bit?

Sorted for result not likely affected by KE (15)

Physics Issue	New Technique on NIF	New Platforms on NIF	End Results	Other Findings	Data examples	Could Kinetic Effects affect End Results or Other Findings?	Does this matter for ignition or how could we avoid/resolve?
Trough symmetry		Thin ablator keyhole			 1	No or little CBET	More data needed
Trough symmetry	Backlit Foamball; 6 quad BABL	Foamball	Accuracy sufficient for 4% trough P4 inference, but surrogacy?	P2 asymmetry has reversed sign of preshot (but only 5%)		No or little CBET	Better data, backlighting shock in actual CH shell (Hall)?
Fuel shape and ρr uniformity	THD Point Projection ARC Compton radiography	THD fill		Artefacts on hGXD led to ERASER		Not likely for low modes if no CBET	Await measurements
Fuel shape and ρr uniformity	Self Compton Scatter imaging			Can apply analysis techniques from downscattered neutron imaging (Casey)	 1	Not likely for low modes if no CBET	Await measurements